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RESILIENCE IN THE LOGISTICS INDUSTRY: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT: The main objective of this article is to examine how organisational resilience is defined and its implications for logistics industry entities. For the purpose of a systematic literature review (SLR), bibliometric analysis and content analysis were used. The analysis reveals no unified definition of resilience in the logistics industry, though a common pattern defines it as an entity's ability to achieve a desired outcome under disruptive conditions. The findings indicate that major disruptions, particularly the COVID-19 pandemic, are the primary reasons for the heightened research interest in this topic. The analysis carried out allows for further methodological work on systematising the concept of resilience in logistics activities (logistics industry), which is important in the context of maintaining the continuity of logistics processes, both from the point of view of supply chains and from the point of view of individual links. This is important from a cost perspective (analysis of the total cost of goods flow) as well as for building customer satisfaction.

KEYWORDS: resilience, logistics, transport, bibliometric analysis, content analysis

Introduction

The global logistics industry is a growth industry with a high rate of innovation that contributes to the increase in employment and to the intensification of economic links between other sectors of the economy. Growth projections for this industry range from 7.2% at CAGR (*Compounded Annual Growth Rate*) (Grand View Research, 2024) for 2024-2030, to 8.36% at CAGR (Precedence Research, 2025) for 2025-2034. These are more cautious and less optimistic projections than the 17.1% CAGR (Fact & Factors, 2023) for 2023-2030, as indicated a year earlier for this industry. Companies in the logistics industry undertake a variety of activities (e.g., transportation, shipping, storage, and many more) to deliver goods, information, and services from their manufacturer to the final recipient/consumer. Logistics companies are a vital link in most global supply chains and improve the performance of their partners by optimising costs, increasing delivery reliability and flexibility of operations, and improving logistics organisation. Potential customers using the services of logistics companies include a wide range of entities, starting with large multinational corporations, manufacturing companies, the e-commerce industry, and individuals using domestic and international courier services. The increase in the value and share of the e-commerce industry in recent years, technological advances, and the ongoing globalisation of production and trade are strong growth factors for the global logistics industry. However, it is also important to note that the logistics industry, through its role in serving other sectors of the economy, is susceptible to any disruption that causes a slowdown in those sectors. Recent years have been full of unforeseen events requiring rapid adjustments to changing conditions. The scale of these events, often local in nature (such as the 2021 blockade of the Suez Canal or the armed conflict in Ukraine), as well as global (such as the COVID-19 pandemic), has far-reaching consequences for economies and for the logistics industry.

Disruptions occurring with increasing frequency are, in turn, generating increased interest in ways to adapt to them more quickly and reduce their overall negative impact on an organisation's operations. In a broad sense, the term resilience, meaning the ability to return to the state before the disturbance/change (Britannica Dictionary, 2024), is of interest to many disciplines (such as engineering, ecology, psychology, and many more), and many approaches to understanding and defining it can be found in the literature (at least 70 identified by Fisher, 2015). Also, in economics and management, the term resilience appears more and more often in the context of research on economies, regions, and organisations. In relation to organisations, the term most often refers to the ways in which they cope with unforeseen events and their consequences.

Given the great importance of the logistics industry and the accumulating disturbances affecting it both directly (difficulties in the operation of logistics companies themselves) and indirectly (difficulties for companies in other sectors served by the logistics industry), it seems justified to conduct research on the resilience of companies in this industry. The authors' initial exploration of this subject revealed a research gap in this area: the topic of organisational resilience is addressed in the context of the logistics industry, but in a particularised and fragmentary way. The only more systematic attempts to indicate the state of the art of resilience research concern maritime transport (Nguyen et al., 2023; Lau et al., 2024), which is part of the global logistics industry. This article is the Authors' attempt to fill the identified gap and aims to examine how organisational resilience is defined and its implications for logistics industry stakeholders.

This article attempts to answer the following research questions:

1. How is organisational resilience defined in relation to companies in the logistics industry?
2. In what context is organisational resilience in the logistics industry considered by other researchers?
3. Which determinants and elements supporting the adaptation activities of companies in the logistics industry are considered important?

The authors hope that the study they undertook will allow the identification of common features and systematisation of the concept of organisational resilience based on the example of the logistics industry. In order to answer the research questions and achieve the stated goal, the authors conducted a systematic literature review, incorporating bibliometric and content analysis, using searches on activities carried out by organisations in the logistics industry. To the best of the authors' knowledge, this is the first study adopting such an approach to examine organisational resilience in relation to such a specific and important industry from the point of view of the global economy as the logistics industry.

The logistics industry is a vital component of the global economic ecosystem and plays a key role in its functioning. The resilience of the companies that make up this industry is relevant to all the other actors that use their services to ensure uninterrupted and continuous connectivity and trade flows. In order to assess the extent to which the resilience of organisations in the logistics industry is the subject of research, the article is divided into four parts. The first one (Section 1) presents the background to the study and identifies the basic concepts, the research goal and the research questions. Section 2 presents the methodology used to conduct the systematic literature review, so that in section three, the results of the bibliometric (Section 3.1) and content (Section 3.2) analysis are presented. Achieved results are discussed in Section 4, along with limitations of the current study and recommendations for further research. The final part (Section 5) concludes the article by summarising the main results.

Research methods

The research in the article consists of a systematic literature review described by Czakon (2015). All steps (Figure 1) of the literature review were carried out from February to July 2024.

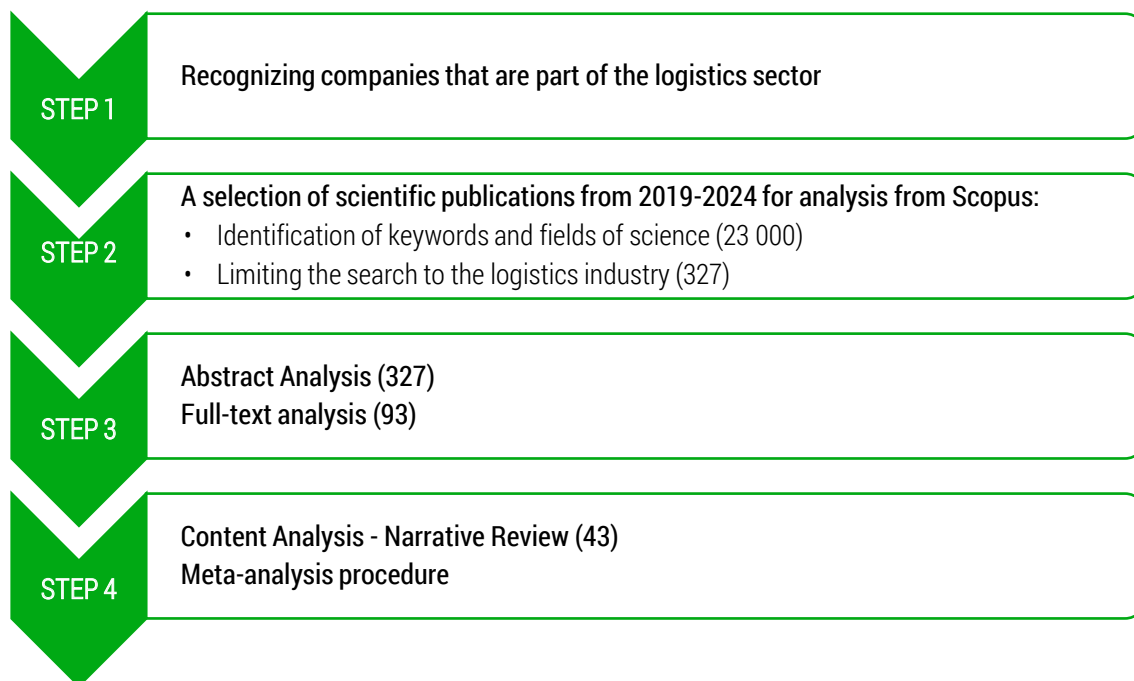


Figure 1. Methodology adopted for systematic literature review, step by step

As a first step, the authors developed a scenario for analysing the current state of knowledge regarding the resilience of enterprises in the logistics industry. Simultaneously, they defined how to identify organisations that are considered parts of the logistics sector, which are the subject of the study. In both literature and practice, the term TSL (Transport, Spedition, and Logistics) has been adopted due to the close meaning of these three concepts and the resulting difficulty in distinguishing between them. This industry is typically identified with Section H – Transportation and Storage in the Polish Classification of Activities (PKD) from 2007 (Polski Instytut Ekonomiczny, 2022; GUS, 2007), which is consistent with the Statistical Classification of Economic Activities (NACE, 2006).

The authors then selected the publications to be analysed based on the Scopus database of scientific publications. An important step in the literature review is the selection of appropriate search criteria to establish the appropriate database for further analysis. The topic of resilience has been studied for many years and covers many research areas. The first search covering the term ‘resilience’ and its variations resulted in 290,318 publications (Table 1).

Table 1. Steps in the retrieval process and their results

Steps	Consecutive query steps	Query strings	Number of documents
1	'resilience' and all words derived from it (i.e., resilient, resiliency) in title, abstract and keywords	TITLE-ABS-KEY (resil*)	290,318
2	publications in the fields of Economics, Econometrics and Finance, and Business, Management and Accounting	TITLE-ABS-KEY (resil*) AND (LIMIT-TO (SUBJAREA , „BUSI”) OR LIMIT-TO (SUBJAREA , „ECON”))	22,747
3	timeframe 2019-2024, publications in the fields of Economics, Econometrics and Finance and Business, Management and Accounting	TITLE-ABS-KEY (resil*) AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA,„BUSI”) OR LIMIT-TO (SUBJAREA,„ECON”))	15,628
4	all words derived from 'resilience' co-occurring with words transport, logistics or shipping (with synonyms), time-frame 2019-2024, publications in the fields of Economics, Econometrics and Finance and Business, Management and Accounting	(TITLE-ABS-KEY (resil*) AND TITLE-ABS-KEY (transport*) OR TITLE-ABS-KEY (logist*) OR TITLE-ABS-KEY (shipping)) AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , „ECON”) OR LIMIT-TO (SUBJAREA , „BUSI”))	1,009
5	all words derived from 'resilience' co-occurring with words transport, logistics or shipping (with synonyms), time-frame 2019-2024, publications in the fields of Economics, Econometrics and Finance and Business, Management and Accounting, limited to open access documents, articles only, language limited to English	(TITLE-ABS-KEY (resil*) AND TITLE-ABS-KEY (transport*) OR TITLE-ABS-KEY (logist*) OR TITLE-ABS-KEY (shipping)) AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND (LIMIT-TO (OA , „all”)) AND (LIMIT-TO (SUBJAREA , „ECON”) OR LIMIT-TO (SUBJAREA , „BUSI”)) AND (LIMIT-TO (DOCTYPE , „ar”)) AND (LIMIT-TO (LANGUAGE , „English”))	327

Source: authors' work based on the Scopus database search results, date: 05.07.2024.

The research area breakdown of Step 1 Scopus publications covering the topic of “resilience” is interesting. The majority of publications refer to the fields of Engineering (14%), Social Sciences (13%), Computer Science (10%), Environmental Sciences (10%), and Medicine (9%). Only 3.3% of publications were published in the fields of Business, Management and Accounting and only 2% in Economics, Econometrics and Finance. The remainder (38.7%) concerns other areas.

As a further step, the Authors decided to limit the search to the fields of Economics, Econometrics and Finance and Business, Management and Accounting, which resulted in a reduction of the number of publications to 22,747. In order to examine the most up-to-date publications, the year of publication was limited to the years 2019-2024, which reduced the number of publications to 15,628.

The criteria defined so far did not take into account the links between resilience and the logistics industry, so the authors decided to add the terms 'transport', 'logistics' or 'shipping' to the query. This search yielded 1,009 publications. As a final step, the search criteria included a combination of the words 'resilience' with the words 'transport', 'logistics' or 'shipping', published between 2019 and 2024, in the fields of Economics, Econometrics and Finance or Business, Management and Accounting, limited to open-access articles in English. This search resulted in 327 articles, which were subjected to further bibliometric and content analysis.

The authors analysed the abstracts of the remaining 327 articles. This analysis resulted in a reduction of the literature base to 93 articles. Abstracts of the 234 rejected articles often covered a research area that was too broad or not related to the aim of the article. Reasons for the rejection of articles included articles related to the logistic regression model (Gyimah & Lussier, 2021), the reactions of cities, regions, and countries to natural disasters (Nayak & Choudhary, 2022; Maharjan & Kato, 2023), urban resilience (Wu & Lu, 2022), household resilience (Hartwig & Nguyen, 2023), tourism (della Corte, Doria & Oddo, 2023), urban transport infrastructure (Kasraei & Garmabaki, 2024), or the construction and maintenance of transport infrastructure in general, which is assigned to other sections in the PKD.

The collection of 93 articles was subjected to full-text analysis. The authors rejected 50 articles after this review. The reasons for the rejections were consistent with those of the previous step. Additionally, the articles in which the authors mention resilience only in the abstract, e.g. Kalpana & Muthusamy (2020) or Standfuss et al. (2024), were rejected. A final analysis was performed on 43 articles.

The bibliometric analysis was performed using MS Excel and VOSviewer version 1.6.20. The analysis allowed for the identification of the most popular publications fulfilling the search criteria, the most popular keywords along with their frequency of occurrence, and to find topics related to resilience in the researched area. In order to better illustrate the issue of resilience in relation to organisations from the logistics industry, it was decided to compare broader results so that the analysis included both the 43 articles chosen for the final analysis, but also the broader ranges resulting from queries 3 and 5 in Table 1.

The next step taken by the Authors was to conduct a content analysis of all texts included in the final set of 43 articles, using the narrative review method (Gondek & Mazur, 2015, p. 141). At the same time, the authors applied a bibliometric analysis, which took into account the following elements of the reviewed articles: keywords, research questions, theories considered, key concepts, definitions of resilience, and its types.

Results of the research

Bibliometric analysis

An analysis of publications covering the word 'resilience' published between 2019 and 2024, in the fields of Economics, Econometrics and Finance or Business, Management and Accounting, shows a stable annual increase. A further analysis of publications including the word 'resilience' combined with the word 'transport', 'logistics' or 'shipping', published between 2019 and 2024, in the fields of Economics, Econometrics and Finance or Business, Management and Accounting, limited to open-access articles in English, shows that by 05.07.2024 it presents a similar trend to the previous search criteria (Figure 2). The decrease in 2024 is due to the analysis being carried out in the first half of 2024.

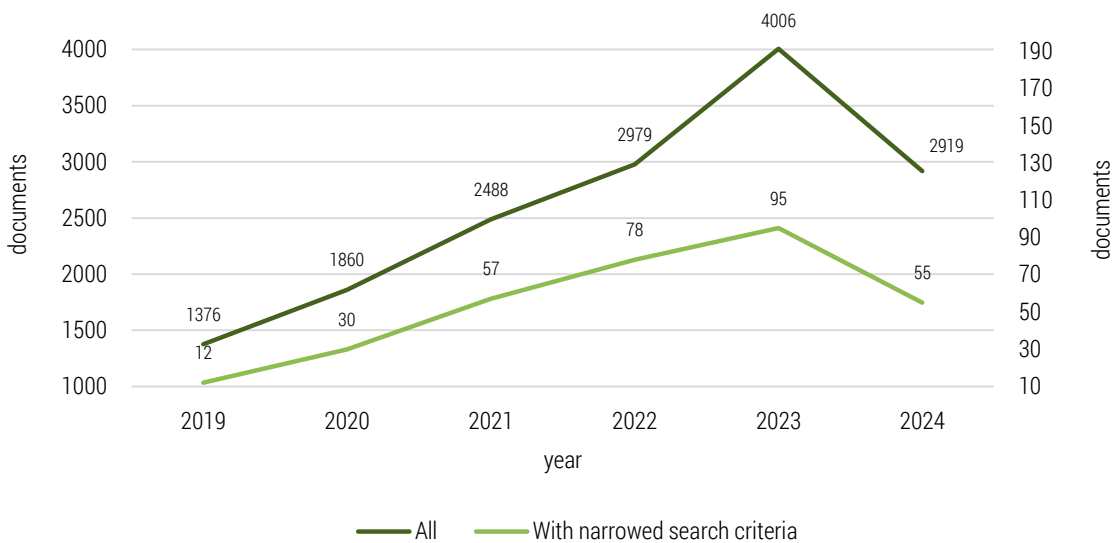


Figure 2. Number of scientific publications indexed in the Scopus database containing all words derived from 'resilience' co-occurring with words transport, logistics or shipping (with synonyms), timeframe 2019-2024, in the fields of Economics, Econometrics and Finance and Business, Management and Accounting between 2019 and 2024, limited to open-access articles in English (until 05.07.2024)

Source: authors' work based on the analysis of the Scopus database search results, date: 05.07.2024.

After abstract and full-text analysis of articles, the final database of articles includes 43 scientific papers. A citation analysis referring to these publications shows that by 05.07.2024, the 10 most popular publications had been cited a total of 1,028 times. It seems interesting that half of these publications refer to the COVID-19 pandemic (Table 2).

Table 2. The most cited publications meeting the selection criteria after abstract and paper analysis

Document Title	Authors & Publication Year	Journal Title	Cited by (excluding self-citations)
Manufacturing and service supply chain resilience to the COVID-19 outbreak: Lessons learned from the automobile and airline industries	Belhadi, Kamble, Jabbour, Gunasekaran, Ndubisi, Venkatesh, 2021	Technological Forecasting and Social Change	471 (457)
Disruptions and resilience in global container shipping and ports: the COVID-19 pandemic versus the 2008–2009 financial crisis	Notteboom, Pallis, Rodrigue, 2021	Maritime Economics and Logistics	232 (224)
Innovation-oriented dynamic capabilities of logistics service providers, dynamic resilience and firm performance during the COVID-19 pandemic	Dovbischuk, 2022	International Journal of Logistics Management	74 (73)
COVID-19 and the pursuit of supply chain resilience: reactions and “lessons learned” from logistics service providers (LSPs)	Herold, Nowicka, Pluta-Zaremba, Kummer, 2021	Supply Chain Management	70 (61)
Role of urban planning characteristics in forming pandemic resilient cities – Case study of Covid-19 impacts on European cities within England, Germany and Italy	AbouKorin, Han, Mahran, 2021	Cities	52 (51)
Evaluation of Cooperative Intelligent Transportation System scenarios for resilience in transportation using type-2 neutrosophic fuzzy VIKOR	Deveci, Gokasar, Pamucar, Zaidan, Wen, Gupta, 2023	Transportation Research Part A: Policy and Practice	34 (30)
Who cares? Supply chain managers' perceptions regarding cyber supply chain risk management in the digital transformation era	Creazza, Colicchia, Spiezia, Dallari, 2022	Supply Chain Management	28 (27)
Adapting our sea ports to the challenges of climate change: Development and validation of a Port Resilience Index	León-Mateos, Sartal, López-Manuel, Quintás, 2021	Marine Policy	28 (25)
Evaluating recovery strategies for the disruptions in liner shipping networks: a resilience approach	Wan, Tao, Yang, Zhang, 2022	International Journal of Logistics Management	21 (16)
Modelling relationships between agility, lean, resilient, green practices in cold supply chains using ISM approach	Al-Refaie, Al-Tahat, Lepkova, 2020	Technological and Economic Development of Economy	18 (15)

Source: authors' work based on the Scopus citation overview.

Using the Scopus database and MS Excel, the authors analysed the occurrence of keywords used for the studies in the identified databases, allowing them to identify the 10 most frequently used keywords, categorised based on publications from steps 3 and 5, as shown in Table 1, and through an abstract and full-text analysis (Table 3). The most frequent keyword was ‘resilience’, mentioned 2,873 times, followed by 70 and 16 occurrences in the two other categories. The second most used word was ‘COVID-19’ with counts of 1,712, 70, and 15, indicating a significant interest in the pandemic-related topic. Additionally, keywords related to supply chains were present across all publication groups. Surprisingly, sustainability and climate change keywords were popular only in two broader publication categories.

For the purposes of the analysis in VOSviewer, the Authors limited the number of keyword occurrences to those occurring in at least three articles. As a result, the number of analysed keywords was limited to the 63 most frequently occurring ones. As a result of the mapping, 10 thematic areas (the so-called clusters) were identified, which are represented by sets of related keywords (Figure 3).

Table 3. Most frequently occurring keywords from publications indexed in the Scopus database

Most frequently occurring keywords from publications indexed in the Scopus database containing all words derived from 'resilience', in the fields of Economics, Econometrics and Finance and Business, Management and Accounting between 2019 and 2024:

			co-occurring with words transport, logistics or shipping (with synonyms), limited to open access documents, articles only, language limited to English			meeting the selection criteria after abstract and paper analysis		
Rank	Keyword	Frequency of keyword occurrence	Rank	Keyword	Frequency of keyword occurrence	Rank	Keyword	Frequency of keyword occurrence
1	resilience	2,873	1	resilience	70	1	resilience	16
2	COVID-19	1,712	1	COVID-19	70	2	COVID-19	15
3	sustainability	781	2	logistic	16	3	air transportation	5
4	climate change	759	2	covid-19 pandemic	16	3	logistics	5
5	sustainable development	697	3	supply chain resilience	15	4	transportation system	4
6	supply chains	524	4	sustainability	11	4	supply chains	4
7	supply chain resilience	460	5	supply chain management	10	4	case-studies	4
8	decision making	432	6	supply chain	9	4	supply chain resilience	4
9	pandemic	380	6	climate change	9	5	decision making	3
10	supply chain management	367	7	circular economy	8	5	transportation planning	3

Source: authors' work based on the data analysis performed in VOSviewer. Source data from 05.07.2024.

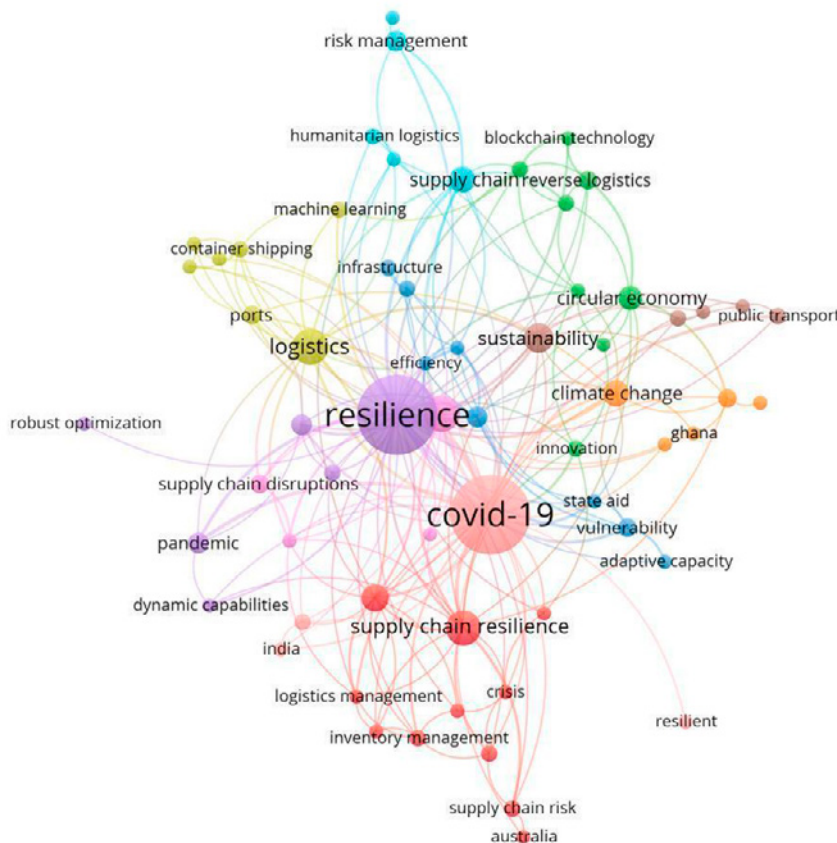


Figure 3. Map of co-occurrence of authors' keywords in publications related to resilience meeting the selection criteria

Source: authors' work based on the analysis performed in VOSviewer.

The central red cluster dominates the map, focusing research on resilience in the context of crises, with the COVID-19 pandemic as the main disruptor. Closely related to it is the purple cluster, which connects this topic to fundamental issues of logistics and efficiency, as well as the green innovation cluster, which groups sustainability, the circular economy, and blockchain technology. Around these clusters orbit smaller, specialised groups, such as the blue cluster for risk management and humanitarian logistics, and the orange cluster, which studies the impact of climate change on system vulnerability. Completing the picture is the yellow-green technology cluster, in which machine learning and infrastructure, such as ports, play a key role. Together, these clearly defined clusters demonstrate the evolution of research from efficiency towards the creation of integrated, intelligent, and sustainable supply chains.

Content analysis

The next step taken to obtain more in-depth and comprehensive information on organisational resilience in the logistics industry was to analyse the content of selected articles (43) in terms of the definition of resilience adopted by different authors.

First, in each of the analysed articles, a definition referring to the concept of resilience was identified in either a literature review or methodological section, and then these identified definitions were subjected to further analysis. The analysis of how resilience is defined in studies on organisations in the logistics industry showed that there is no unified approach to defining this concept.

The most common approach in the analysed articles (in more than 2/3 of the analysed works) is to refer to definitions taken from other, earlier studies. Some authors referenced the used definition to only one source (12 articles), while others were more thorough with their review, and referenced at least two different works as a source for the used 'resilience' definition (15 articles). Only in a few works (3 articles) do the authors propose their own definition based on a review of previous studies. In several (4) works, the definition of resilience was provided without indicating the source or crediting the authorship. The most surprising for the Authors was the lack of indication of the definition of resilience adopted for the purposes of the conducted research (9 articles), as in the case, for example, of the study by León-Mateos et al. (2021) referring to resilience in maritime transport and creating a measure of resilience for ports, the Port Resilience Index (PRI).

The lack of indication of the source of the definition used, or the lack of a definition of resilience at all, may suggest that this concept is so widely known and unambiguous that there is no need to cite it for the purposes of research concerning organisations from the logistics industry. However, taking into account the way in which the cited definitions of resilience are formulated in relation to the activities carried out by companies from the logistics industry in the analysed studies, such a suggestion about the unambiguity and universality of this term should be rejected. Table 4 indicates how the concept of resilience is formulated for 34 of the analysed studies in which such a definition was indicated.

Table 4. Manner of formulating the definition of 'resilience' in the analysed papers

Type of definition	No. of articles	Explanation of how the definition is formulated
General	21	Short definition (one, two sentences) describing the concept of resilience in a general way
Detailed	8	Longer definition, including, in addition to an explanation of the concept of resilience, other elements, e.g. features or components of the concept
Adapted to the specific subject of the study	17	Usually a short definition (one, two sentences) describing the concept of resilience from the point of view of the subject of the study, adapted to the specific subject of the study

Source: authors' work based on literature analysis.

It should be noted that for 12 of the analysed studies, the authors cited more than one definition of resilience. The most common approach (6 studies) is that the authors, after citing a general definition of residuality, adapted it for their subject of study, such as Shi et al. (2022) or Zarbakhshnia & Karimi (2024). The second most common approach (4 cases) is to invoke a general definition of

resilience and make it more specific, e.g., by indicating its component features or its subtypes resulting from additional conditions – as was the case, for example, in the work of Ghazy et al. (2022) and Yue & Mangan (2023). The rarest option was for the authors to cite a detailed definition adopted to the subject of the study – such an approach was only used in the works of Al-Refaie et al. (2020) and Borowski et al. (2023).

In the case of the analysed studies, attention was also paid to the perspective from which resilience in the logistics industry was examined. In the case of articles where a definition was provided, conclusions about the adopted perspective were made on its basis. For 9 of the analysed articles that did not provide a definition of resilience, conclusions about the adopted perspective were made based on the declared purpose of the study and/or the adopted research questions. In all analysed studies, ‘resilience’ is perceived as a ‘feature’, ‘attribute’ or ‘ability’ attributed to the subject of the study – Table 5.

Table 5. Summary of resilience-related research perspective in the analysed papers

Research perspective	No. of articles	Context of the research perspective
Transportation system resilience	17	resilience defined as a particular transportation system’s attribute or ability to perform in a certain way with a focus on a given type of transportation system e.g. urban transport system, air transport system, maritime transport system, container transportation system
Supply chain resilience	18	resilience defined as a supply chain’s attribute or ability to perform in a certain way
Organisation/business resilience	14	resilience defined as an organization’s attribute or ability to perform in a certain way – with a focus on a given type of entity e.g. airport, maritime port, logistic service providers, warehouses

Source: authors’ work based on literature analysis.

As in the case of how the term ‘resilience’ was defined (Table 4), in the case of the identified perspectives adopted in the studies in the analysed articles, their number (49) is greater than that of the articles themselves (43), this is due to the fact that in several (6) studies the adopted scope of the study is broad and the research was conducted from several perspectives. In most cases, this is due to the inclusion in the study of resilience of both supply chains and the entities involved in them, as is the case in the articles: Colabianchi et al. (2023), Herold et al. (2021), Notteboom et al. (2021), Sadha et al. (2024) and Sundarakani & Onyia (2021). It is interesting to note that in two of the mentioned articles – Sundarakani & Onyia (2021) and Notteboom et al. (2021) – the authors did not provide a definition of resilience at all. Herold et al. (2021) in their study proposed an original definition combining resilience as a characteristic of the supply chain with the resilience of logistics service providers (as one of the types of entities operating in the logistics market) – this is one of the three original definitions identified in the analysed studies. The last among the analysed studies with an indicated broader research scope is the article by Nguyen et al. (2023), which is a systematic literature review on counteracting disruption in the maritime transportation system and maritime supply chains. It is also one of 9 articles in which the concept of resilience is not defined, and the term itself is used to describe a feature of the maritime transportation system and supply chains. In the case of 2 studies examining resilience in relation to supply chains (Azam et al., 2023; Gaudenzi et al., 2023), defining resilience of supply chains is done by referring to resilience as a system feature. Furthermore, in the already cited study by Colabianchi et al. (2023), resilience is indicated as a system feature relevant to the performance of the supply chain and the warehouse as its essential component.

Comparing the research perspective adopted in the analysed articles on the resilience of organisations from the logistics industry (Table 5) and the most frequently occurring keywords (Table 3), it can be seen that in both cases, supply chains and transportation systems were indicated. Surprisingly, the authors of the studies indicated both the keywords ‘supply chain resilience’ and ‘transportation system’ less often than they actually appeared as the subject of study in the analysed articles. Accordingly, there were 4 indications of the keyword ‘supply chain resilience’ out of 18 articles examining resilience in relation to supply chains and also 4 indications of the keyword ‘transportation system’ out of 17 articles examining resilience in relation to transportation systems.

The conducted analysis of the definitions of resilience cited and adopted in the analysed articles, regardless of the adopted research perspective, the way of defining or formulating the concept of 'resilience' allowed for the identification of certain common elements. Definitions of resilience usually take the following form:

- resilience is perceived as a certain ability or trait,
- of a particular entity (company, system etc.),
- to achieve a desired outcome,
- under particular conditions or in the case of a certain type of disturbance/issue.

In most of the definitions identified in the studies analysed, all the elements indicated are present and, of course, described/formulated in different ways. For example, the third element of the definition indicating the expected/desired outcome resulting from resilience can be referred to as, e.g., 'to maintain normal operations' (Feng et al., 2023), 'to reorganise and deliver its core functions continually' (Al-Refaie et al., 2020) or 'to prevent and absorb changes, and regain the initial performance level' (Belhadi et al., 2021). Despite the use of different wording or a different order of the elements indicated, the basic pattern of definitions remains the same: 1) resilience as an attribute, 2) of the entity, 3) to achieve an effect, and 4) under certain conditions. Any future attempts to propose a unified definition of resilience for the needs of entities from the logistics industry should take into account the outline indicated by the Authors.

Discussion, limitations and future research

Studies on the resilience of actors in the logistics industry in relation to supply chains have adopted different research assumptions and focused on other aspects related to resilience. Thus, for example, Al.-Refaie et al. (2020) and Zarbakhshnia & Karimi (2024) perceived resilience as one of the characteristics that should be considered in activities carried out within sustainable supply chains. Alsmairat et al. (2023) point to the key importance of resilience in mitigating various types of risk with regard to the operation of supply chains. A similar approach was taken in a study by Chodakowska et al. (2024) using the example of risks resulting from the COVID-19 pandemic. Colabianchi et al. (2023) developed a practical tool to facilitate the identification of key areas requiring intervention in the event of disruption using data on disruption caused by the COVID-19 pandemic.

Asafo-Adjei et al. (2023) explore the relationship between supply chain complexity, potential disruptions, and applied resilience strategies, while Gaudenzi et al. (2023) adopt a contingent resource-based view (CRBV) to build resilience strategies for supply chains. The study by van der Westhuizen & Niemann (2022) supports the resilience of their customers among the roles played by supply chain actors.

Azam et al. (2023) attempt to identify and analyse critical success factors for ensuring the resilience of supply chains. Brookbanks & Paryy (2024) study the impact of digital technologies on the resilience of cross-border supply chains. Additionally, studies by Creazza et al. (2022) and Sadha et al. (2024) address risk mitigation and increasing supply chain resilience using digital technologies. The former (Creazza et al., 2022) points to the great importance of the human factor in risk mitigation when using digital technologies, while the latter (Sadha et al., 2024) adopts a more resource-based view akin to Gaudenzi et al. (2023) in this regard. Shakur et al. (2024) identify the biggest challenges in implementing Industry 4.0 solutions to improve the resilience of fast-moving consumer goods (FMCG) supply chains.

Some studies examine the impact of the COVID-19 pandemic disruptions on the resilience of supply chains and the actions taken to counter them, using examples from both the automobile and airline industries (Belhadi et al., 2021), express couriers (Garola et al., 2023), logistic service providers (Herold et al., 2021), container ports and container industry (Notteboom et al., 2021) or the UAE supply-chain industry (Sundarakani & Onyia, 2021).

The systemic approach to logistics companies and their resilience or their role in building resilience for other actors also varies considerably and includes, for example, planning urban transport systems to increase resilience using lessons learnt from the COVID-19 pandemic (AbouKorin et al., 2021). Mobility and resilience of urban public transportation were also addressed in Borowski et al.'s (2023) study of ridesourcing as a way to increase mobility in the event of disruptions to rail transit

services in Chicago, and Xu et al.'s (2024) study pointing out the interdependency of transit networks and the risk of transferring disruptions between them. Transportation planning and prioritisation of infrastructure investment retrofit projects in relation to system-wide resilience to disruptions caused by natural disasters was the subject of a study by Shi et al. (2022). Sugimura & Murakami (2021) identify a potential solution for increasing the resilience of international reverse logistics using seaports, in the example of Japan.

As in the case of studies on the resilience of supply chains, some of the analysed studies, such as Deveci et al. (2023) and Feng et al. (2023), address issues related to the potential of modern technologies as a factor in building resilience in transportation systems. Ghazy et al. (2022), in their discussion on the potential of modern technologies for enhancing transportation system resilience, point to ITS, Big Data and Smart Buses as the most promising. Fjørtoft et al. (2023) go a step further in their considerations and propose a tool for assessing resilience for an autonomous and sustainable transportation system using the maritime corridor between Trondheim and Rotterdam as an example. Furthermore, the study by Nguyen et al. (2023) proposes a model to facilitate countering disruptions in the maritime transportation system based on new technologies and digitalisation.

Studies on the resilience of the transport systems of individual transport modes are also popular. Wan et al. (2022) and Yue & Mangan (2023) identify factors influencing the increased resilience of the maritime transport system, taking into account the characteristics of the different actors of the system and the nature of disturbances. Wang et al. (2023) and Yassien et al. (2020) analyse the factors influencing the resilience of the air transport network and propose models to improve its efficiency and safety. There is also a recurring theme of disruption caused by the COVID-19 pandemic in the operation of transport systems, using the example of container transport management (Kuzmich, 2022), new solutions for last-mile delivery (Pahwa & Jaller, 2023), and the European aviation market (Su et al., 2023).

The resilience of logistics operators in response to the disruption caused by the COVID-19 pandemic was the topic studied most frequently among the analysed papers. Studies addressed the resilience of: seaports (Ayaz et al., 2022; Notteboom et al., 2021), warehouses (Colabianchi et al., 2023), airports (Colak et al., 2023), shipping lines operators' charter strategies (D'agostini et al., 2024), logistic services providers (Dovbischuk, 2022; Herold et al., 2021; Ketudat & Jeenanunta, 2021; Sundarakani & Onyia, 2021), Romanian transport and tourism companies (Neacșu & Georgescu, 2024), and Puerto Rican SMEs (Orengo-Serra & Sánchez-Jauregui, 2021). In three cases, the authors, in their studies, compared the disruption caused by the COVID-19 pandemic with other sources of disruption: the 2007-2008 global financial crisis (Neacșu & Georgescu, 2024; Notteboom et al., 2021) and earthquakes (Orengo-Serra & Sánchez-Jauregui, 2021). Only León-Mateos et al. (2021), in their article on the development of a port resilience index (PRI), do not indicate any specific type of source of disruption requiring resilience on the part of seaport operators.

The authors are aware of the limitations of their work, which include the adopted methodology and search strategy for the studies analysed and the restriction to only one database of scientific publications. With regard to the selection of the database of scientific publications used and the restriction to only open-access publications, the Authors were guided by the intent for transparency of the selection of studies and the possibility of replicating the obtained results by others interested in conducting research in this area. Another limitation was the difficulty of assigning entities to the logistics industry for the purposes of the study; the authors decided to use existing classifications based on the scope of activities performed by a given entity and, on this basis, select the concepts used as search criteria. Nevertheless, during the content analysis with regard to the logistics industry and the small share of studies on warehouses, the authors pointed to the possibility of including additional terms in the search criteria, such as 'warehouse*' or 'storag*' for further research.

Expanding the base of analysed studies, whether by including additional databases of scientific publications or by changing the search criteria, is one of the potential directions for further research. An attempt to systematise the definition and its components, or to extend the scope of the study to include measurements and strategies, or a tool for creating resilience by actors in the logistics industry, is another area for further research.

Conclusion

The considerations and analyses of studies on the resilience of entities operating in the logistics industry allowed us to achieve the adopted goal and to answer the research questions. As for the first research question, there is a lack of a universally accepted and used definition of resilience for the purpose of the research concerning organisations from the logistics sector. Virtually every article identifies a disruption for which a company should demonstrate resilience. Nevertheless, it should be noted that there is a certain ambiguity about how resilience is understood and defined. Despite the Authors' identification of common elements present in most of the definitions cited or developed for the studies analysed, referring to the general definition of resilience, there is no agreement on and unification of this concept in the cited works. Individual authors of the analysed studies make use of earlier works, which means that their considerations are well grounded in the literature on the subject, but instead of systematising the issue, they only multiply the definitional chaos/confusion.

In the case of the second research question, it was observed that resilience is usually considered by other authors in the general sense and in relation to supply chains or enterprises. Furthermore, as a research topic, the resilience of organisations from the logistics sector is gaining popularity. This was observed in the results of the bibliometric analysis conducted by the Authors and in the works of other authors, e.g. those relating to supply chains (Paul & Saha, 2025) or the resilience of enterprises (Su & Junge, 2023). The third research question was harder to answer – the determinants or reasons for growing interest in pursuing resilience were more commonly addressed than the methods for achieving it. The growing interest in the topic of resilience may result from the increasing instability of the environment caused by hard-to-predict random events affecting both the functioning of the logistics industry and other sectors of the economy it serves. The COVID-19 pandemic, in particular, seems to be of particular importance as a trigger for increased interest in the topic of resilience. The bibliometric analysis carried out by the Authors relating both to the term 'resilience' itself and after narrowing the search to the logistics industry, seems to confirm this assumption. 'COVID-19' was the most frequently cited keyword after 'resilience', both in the overall analysis and after narrowing the search to the logistics industry. Similarly, among the 10 most frequently cited studies, 6 of them (both for the general analysis and after limiting to publications in the fields of 'Economics, Econometrics and Finance' or 'Business, Management and Accounting' on the logistics sector – Table 2) were related to the impact of the COVID-19 pandemic. Also, among the articles subjected to content analysis, the COVID-19 pandemic was represented by about one-third of all analysed articles. Other disruptions identified as important causes for building resilience in logistics companies included local-scale disruptions such as natural disasters (earthquakes or floods) or events limiting access to transport infrastructure (e.g. the blockade of the Suez Canal). Two cases (Neacșu & Georgescu, 2024; Notteboom et al., 2021) attempted to compare the effects and impact of the COVID-19 pandemic on logistics industry actors in relation to another global disruption – the 2007-2008 international financial crisis. The lack of agreement on the adopted definition, its components, characteristics, etc., hinders the development of tools to measure resilience or the preparation of strategies to build it, although such aspects were also among the subjects of research in the studies analysed.

The analysis carried out by the Authors on the definition of resilience for the purpose of research on entities from the logistics industry may serve as a basis for further methodological work on systematising this issue, preferably referring to works on enterprise residuals in general, but taking into account the specificity of this industry (as in the case of work by Ingram (2023) on the organizational resilience of family businesses). As an alternative direction to attempts to define resilience in relation to entities from the logistics industry, an attempt can be made to adopt a concept of supply chain resilience, after conducting a detailed analysis of this approach.

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The contribution of the authors

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ODPORNOŚĆ W BRANŻY LOGISTYCZNEJ: SYSTEMATYCZNY PRZEGLĄD LITERATURY

STRESZCZENIE: Głównym celem artykułu jest zbadanie, w jaki sposób definiowana jest odporność organizacyjna i jakie są jej implikacje dla interesariuszy branży logistycznej. W tym celu dokonano systematycznego przeglądu literatury (SLR), analizy bibliometrycznej i analizy treści. Analiza wykazała brak jednolitej definicji odporności w branży logistycznej, choć zidentyfikowane wspólne komponenty pozwalają określić ją jako zdolność podmiotu do osiągnięcia pożądanego rezultatu w warunkach zakłóceń. Wyniki wskazują, że poważne zakłócenia, w szczególności pandemia COVID-19, są główną przyczyną wzmożonego zainteresowania badawczego tym tematem. Przeprowadzona analiza pozwala na dalsze prace metodyczne nad usystematyzowaniem koncepcji odporności w działalności logistycznej, co jest istotne w kontekście zachowania ciągłości procesów logistycznych zarówno z punktu widzenia łańcuchów dostaw, jak i z punktu widzenia poszczególnych ogniw. Jest to ważne z punktu widzenia kosztów (analiza całkowitego kosztu przepływu towarów), a także dla budowania satysfakcji klientów.

SŁOWA KLUCZOWE: odporność, logistyka, transport, analiza bibliometryczna, analiza treści